



Fort Keogh Researcher

USDA-ARS
Livestock and Range Research Laboratory



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Introduction

*Dr. Rod Heitschmidt
Research Leader*

Since the publication of our last *Fort Keogh Researcher*, a lot has or is happening at Fort Keogh. The following is a brief update.

A. We recently received 1000 copies of our **2003 Research Update**. This 95 page publication provides an overview of our most recent research findings and is available upon request. Please contact us if you desire a copy.

B. We have hired Mr. Jack Attig as our new **Administrative Offi-**

cer. Jack is resigning his position with the Kansas Army and Air National Guard to join us in mid-April. Plans are for his wife and 3 daughters to join him in June.

C. Once again, we are interviewing three highly qualified candidates for our **molecular geneticist position**. Our hope is to fill this position by mid-summer.

D. Recently, **Dr. Lance Vermeire** joined our staff. Lance is a Rangeland Ecologist, a native of Oklahoma, and a recent graduate of



*Rod Heitschmidt, Research Leader
and Range Ecologist*

Texas Tech University. His research will focus on the development of sustainable rangeland management and livestock grazing strategies with particular emphasis on understanding the role of fire in maintaining Northern Great Plains range-

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Our Vision:

A world-renowned research program that provides knowledge relevant to efficiently producing nutritious and palatable beef from rangeland based livestock production systems.

Our Mission:

To develop ecologically and economically sustainable range livestock production systems that meet consumers' expectations.

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lands. He and his wife Leah have a 1 year old daughter named Charlie.

- E. We also recently hired **Ms. Vicki Reisenauer** to serve as our **Statistician** and **Data Base Manager**, and **Ms. Sharon Stanton** to serve as our **Computer Specialist**. Vicki is a native of North Dakota and a recent graduate of Montana State University with a M.S. degree in animal science with an animal genetics emphasis. Sharon is a native of Illinois and a graduate of Umpqua Community College in Roseburg, Oregon. She joins us after an 18 year career with the U.S. Forest Service with her last station being Burns, Oregon. She and her husband, Dennis, have 2 grown children.
- F. We are also in the process of hiring an additional **technician** in support of Dr. Vermeire's program and gearing up to hire two new **scientists and supporting**

technicians in support of our new invasive plant research program. Their charge is to examine the current and potential role that animals, particularly livestock, play in the invasion and control of invasive weeds such as leafy spurge and knapweed, and to develop effective management strategies for preventing and controlling such invasions. This work will be closely tied to the invasive weed work at the Sidney, MT, Mandan, ND, and Cheyenne, WY, ARS laboratories.

- G. **Construction** of the new \$3.7 M additions to our laboratory began March 26. The construction includes replacing 3 of our 1970's style indoor laboratories and our greenhouse, remodeling our animal nutrition laboratory, and adding a modern technology transfer addition and several new offices. As you can imagine, this is going to create some real turmoil as

we will have to vacate portions of the building to facilitate construction. But we are confident that it will all prove to be worthwhile in the end which is scheduled to be 14 months after beginning the project.

- H. We are not very optimistic that we are going to be able to fill our vacant Montana State University **Extension Beef Cattle Specialist Position** in the near future considering the rather dire financial situation in Helena. Still, we are hopeful that the position will eventually be filled as it proved to be of great benefit to the rangeland beef cattle industry of Montana and surrounding states.
- I. Miles City and Custer County will be hosting a joint meeting of the **Montana Stockgrowers Association and Montana Farm Bureau** during the week of June 11. Fort Keogh will serve as a tour stop on Friday, June 13.

Building Design Progress

Fort Keogh is in the process of adding onto the main office/laboratory building. A conference and training center will be added to the front of the building, and new laboratories, associated offices, and a greenhouse onto the back of the building.



Getting First Calf Heifers Rebred

By Tom Geary
Research Physiologist

The most common reproductive problem that both purebred and commercial beef producers face is getting first calf heifers rebred. This is a common problem because we are trying to rebreed a cow that has not yet reached her mature weight and is often faced with the task of consuming enough energy to satisfy needs for growth, lactation, and maintenance when generally only poor quality forage is available. In most operations, pregnancy rate of either the 2- or 3-year old cows is the lowest in the herd. Economically, the 2-year old cow is the most expensive/valuable animal on the ranch because of the dollars invested in her and because she has not yet returned any income to the operation. Because of the estimated \$950 involved in developing each replacement heifer and carrying her through until calving, producers cannot afford for these cows to fall out of the herd because of reproductive failure as 2-year olds. Put another way, producers can easily justify additional expenses to ensure these females rebreed rather than having to develop another replacement heifer.

Over the past 30 years, numerous studies have been conducted to identify the problems and improve the rebreeding efficiency of first calf heifers, including numerous studies at

Fort Keogh. We all know that after calving, older cows require 40 to 60 days to recover from calving and overcome a negative energy balance before they begin having regular estrous cycles and can be rebred. First calf heifers often require 70 to 90 days to recover and overcome the negative energy balance before they begin having regular estrous cycles and can be rebred. This interval from calving until the re-initiation of estrous cycles is often referred to as a cow's postpartum anestrus interval or more commonly, postpartum interval (PPI). The key to increasing pregnancy rates is to increase the number of opportunities a cow has to conceive during a defined breeding season. Decreasing the PPI, or enhancing a first calf heifer's return to estrous cycles so that she is cycling before the start of the breeding season, increases her chances of conceiving.

A part of the reason that producers are advised to breed heifers to calve 3 weeks ahead of the cow herd is to provide additional time to overcome the longer PPI before the start of the subsequent breeding season. While this works well in theory, it can backfire. Calving heifers ahead of the cowherd generally means calving earlier in the spring and a longer interval until green grass is available. If sufficient nutrients are not provided to heifers with newborn calves, they can actually be further behind (still in a negative energy balance) at the start of the breeding season. Thus, it is essential to provide these females with the best resources we have and can af-

ford. It is difficult if not impossible to provide sufficient feed to cows after calving to avoid the negative energy balance, so we need to prepare them for this period by allowing them to develop energy stores before calving and ensure they are in adequate body condition at calving. Adequate body condition is a condition score of 5 to 6 (moderate) at calving. The plane of nutrition the last 50 to 60 days before calving has a profound effect on PPI. Feeding ionophores such as Bovatec® or Rumensin® after calving increases feed costs less than two cents per day, but shortens the PPI in cows by an average of 18 days provided adequate energy is available.

If producers are unable to calve heifers ahead of the cowherd, then it is essential that heifers calve early in the calving season. That means producers should consider synchronizing heifers (even with natural service) and retaining only those that were bred early (during the first 25 days of the breeding season). The simplest and cheapest method of synchronizing heifers for natural service would be to feed MGA in pellets for heifers for 14 days, and turn in the bulls two weeks after the last feeding of MGA.

Identification of early pregnancies among heifers may require earlier pregnancy diagnosis than producers are accustomed to and may require pregnancy diagnosis with ultrasound to improve accuracy of fetal aging. Heifers that calve late as 2-year olds, often fail to rebreed or calve later as 3-year olds and then fail to conceive as 3-year olds. In most herds, a replacement female will not pay for

herself until she has weaned her 4th calf as a 5-year old.

Many beef producers artificially inseminate their heifers to sires proven for calving ease to decrease chances of dystocia, as dystocia also increases the PPI. Dr. Bellows has demonstrated that providing early calving assistance when intervention is needed greatly decreases the interval from calving to the subsequent pregnancy.

Exposing first calf heifers to either sterile bulls or androgenized cows following calving helps re-initiate estrous cycles. Montana State University researchers have demonstrated that bulls produce a pheromone and that approximately 30 days of bull exposure is required to induce cyclicity. Most studies have utilized bull or androgenized cow to heifer ratios of 1:20 to produce this effect.

Estrous cycles can be induced in cows after calving with hormones used for synchronization. Most cows have a short estrous cycle or may ovulate without expressing estrus just before they begin having regular estrous cycles. This short cycle produces progesterone for 5 to 8 days that helps synchronize hormonal control of the cow's estrous cycle. We can administer progesterone to anestrous cows in the form of a CIDR, which is a device that is inserted into the vagina and releases progesterone until it is removed 7 days later. When we administered CIDRs to early postpartum cows last year, estrous cycles were initiated in 100% of cows and almost 60%

of them were in estrus within 5 days after it was removed. Another hormone, referred to as GnRH, can also be used to induce estrous cycles following calving. An injection of GnRH initiates a short estrous cycle in anestrous cows by eventually causing release of progesterone for 5 to 7 days. The estrous cycle following this short estrous cycle is generally very fertile. With either of the hormonal induction methods, cows need to be at least 30 days since calving before any benefit will be achieved.

Over the years, Dr. Short has demonstrated that perhaps the greatest factor affecting the postpartum anestrous interval is due to the demand lactation places on a cow. As indicated earlier, this is especially true for first calf heifers, as they are still diverting energy for growth as well as lactation. Short-term (48-hour) calf removal helps induce release of GnRH within a cow and helps induce estrous cycles. This is very effective in anestrous cows, but is less effective in anestrous 2-year olds, perhaps due to the "depth" of anestrus. However, early and permanent weaning holds more promise for improving reproductive efficiency in first calf heifers than probably all of the other methods combined. Early weaning has received considerable attention within the last few years, particularly because of the drought we've faced. Each operation may define early weaning differently, but if it is to impact reproduction, then it must occur before the end of the breeding season and is even more beneficial if it occurs at the beginning of the

breeding season. As one might expect, early weaning completely eliminates the energy that was needed for lactation, so now the cow can divert extra energy to reproduction. Several studies have been reported in which early weaned 2-year olds experienced dramatic increases in pregnancy rates and/or increases in the percentage of calves born early the subsequent year (for example, 26% increase in pregnancy rate with early weaning; 59% vs 97% pregnancy rate for normal vs early weaned heifers; 46% vs 81% of early weaned 2-year olds calving within the first 30 days as 3-year olds...). Depending on how early your heifers' calve, this may mean weaning calves that are 30 to 60 days old. Visions of bottle feeding hundreds of calves 2 to 3 times a day can be erased from your head. As long as we provide early-weaned calves a highly palatable ration that is dense in energy, these calves will out perform calves left on cows. Dr. John Paterson (MSU Beef Extension Specialist) suggests rations designed to provide at least 2.7 lb/d gain and containing at least 50 to 70% concentrates (wheat middlings / corn / barley mixtures have worked best) and 30 to 50% grass hay (alfalfa hay is not recommended) for early weaned calves. In the past few years, grain prices have been low enough that early weaning has been profitable through increased weight gains alone. Remember that each 2-year old that successfully rebreeds translates into a \$950 savings in heifer replacement cost when grain prices are higher.

Society for Range Management Award Recipients

Presented at the 56th Annual Meeting, Casper, WY, February 2003

Outstanding Achievement Award



Dr. Elaine Grings has played a significant role in range nutrition research in the western United States and the northern Great Plains. Her work has focused on removing nutrient limitations to production, improving nutrient use and reducing loss of nutrients, and improving management practices for beef production from rangelands, pastures, and forages.

Dr. Grings has transferred nutrient information and application to livestock producers and agency personnel through presentations at producer meetings, tours, and field days. She has shared information through newspaper and magazine interviews, agricultural press publications, and extension bulletins. She has spoken at numerous meetings, including the Montana Governor's Range Tours and Grazing Seminars.

She has been a member of the Society for Range Management throughout her professional career, and is well known for her tireless and selfless dedication to the Northern Great Plains Section, as well as to her community. She enjoys a reputation for always being there when needed, in any capacity, to get the job done. **Dr. Elaine Grings** is hereby presented the Society's **Outstanding Achievement Award**.

Outstanding Young Range Professional Award



Keith Dale Klement is highly motivated, with a deep and abiding love for rangelands and an obvious desire to manage and conserve them for future use. He's a willing volunteer at every opportunity to promote rangelands and to educate others about their importance for a variety of multiple uses and values. Keith has been involved in the Society for Range Management since he began his undergraduate education at Texas Tech; his field studies have also taken him to Oklahoma, Wyoming, and now Montana. His contributions to the Northern Great Plains Section and the parent Society are already notable.

Keith has donated countless hours of his time to motivate and educate generations of all ages about the importance of rangelands. Because of his knowledge and desire to promote sound management, 4-H clubs, FFA chapters, and federal and state agencies contact him regularly to seek advice or assistance regarding ecological issues.

Mr. Klement's honesty, integrity, enthusiasm, and dedication serve as an outstanding example for the youth of today to follow in the management of our natural resources. His potential for leadership and promise for excellence in the field of rangeland management make **Keith Klement** well deserving of recognition as 2003's **Outstanding Young Range Professional**.

Recent Publications

(for reprints email us at reprints@larl.ars.usda.gov or call Mary Ellen at 406-232-8224)

- Bellows, D.S., Ott, S.L., and Bellows, R.A. 2002. Review: Cost of reproductive diseases and conditions in cattle. *Prof. Anim. Sci.* 18:26-32.
- Branson, D.H. and Haferkamp, M.R. 2002. Effects of the timing and intensity of sheep grazing on grasshopper populations. *Society for Range Manage. Abstract.* p. 288.
- Cronin, M.A., Patton, J.C., and MacNeil, M.D. 2003. Genetic variation in caribou and reindeer (*Rangifer tarandus*). *Animal Genetics.* 34:33-41.
- Funston, R.N., Ansotegui, R.P., Lipsey, R.J., and Geary, T.W. 2002. Synchronization of estrus in beef heifers using either melengesterol acetate (MGA)/prostaglandin or MGA/Select Synch. *Theriogenology* 57: 1485-1491.
- Funston, R.N., Geary, T. W., Ansotegui, R.P., Lipsey, R.J., and Paterson, J.A. 2002. Supplementation with whole sunflower seeds before artificial insemination in beef heifers. *Prof. Anim. Sci.* 18:254-257.
- Funston, R.N.; Paterson, J.A., Williams, K.E., and Roberts, A.J. 2002. Feeding and marketing cull cows. *Realistic Solutions for Maintaining the Sustainability of Montana's Livestock Industry*, Proc. 51st Montana Nutrition Conf.; Montana State University, Bozeman, MT. p. 18-23.
- Geary, T.W. Improve your AI pregnancy rates. 2003. *Western Farmer Stockman.* March. p. 44-45, 48, 50.
- Geary, T.W. 2002. Synchronizing estrus in beef cattle. *Cow-Calf Management Guide and Cattle Producer's Library.* Cooperative Extension System; Cooperative Extension Bulletin.
- Geary, T.W., McFadin, E.L., MacNeil, M.D., Grings, E.E., Short, R.E., Funston, R.N., and Keisler, D.H. 2003. Leptin as a predictor of carcass composition in beef cattle. *J. Anim. Sci.* 81:1-8.
- Haferkamp, M.R., Grings, E.E., Heitschmidt, R.K., and MacNeil, M.D. 2002. Quality and persistence of forages in the Northern Great Plains. *J. Range Manage.* 55:482-487.
- Heitschmidt, R.K. and Haferkamp, M.R. 2003. Ecological consequences of drought and grazing on grasslands of the Northern Great Plains. *Changing Precipitation Regimes and Terrestrial Ecosystems.* The University of Arizona Press, Tucson. pp. 107-126.
- Heitschmidt, R.K. and Kirby, D. 2003. Range programs at risk: University range departments face cuts and consolidation, but that doesn't mean managing grass is insignificant. *Western Farmer-Stockman.* February. p. 20.
- Kruse, R.E., Tess, M.W., Heitschmidt, R.K., Paterson, J.A., and Klement, K. 2002. Evaluation of drought management strategies for cow-calf enterprises: A practical predictor of growing season forage production. *Proc. West. Sect. Am. Soc. Anim. Sci.* 53:212-215.
- MacNeil, M.D. 2002. Relationship between milk production and milk EPD. *Hereford World.* Sept. 10, 27.
- MacNeil, M.D. 2002. Relationship between milk production and milk EPD. *Hereford America.* Oct; 7:25.

MacNeil, M.D. and Grosz, M.D. 2002. Genome-wide scans for QTL affecting carcass traits in Hereford x composite double back-cross populations. J. Anim. Sci. 80:2316-2324.

Phillips, W.A., Coleman, S.W., Grings, E.E., Riley, D.G., Chase, C.C., Short, R.E., Mayeux, H.S., and Heitschmidt, R.K. 2002. Performance of steer calves reared in temperate or sub-tropic environments and used as stocker calves on winter wheat pastures. MacKown, C. T. and Garbrecht, J. (eds.) Progress Reports from the Grazinglands Research Laboratory. Field Day 2002; El Reno, OK. p. 44-45.

Phillips, W.A., Grings, E.E., Holloway, J.W., Short, R.E., Warrington, B., Mayeux, H.S., and Heitschmidt, R.K. 2002. Increasing the performance of stocker calves on winter wheat pasture. MacKown, C.T. and Garbrecht, J. (eds.) Progress Reports from the Grazinglands Research Laboratory. Field Day 2002; El Reno, OK. p. 49-50.

Sowell, B.F., Bowman, J.G.P., Grings, E.E., and MacNeil, M.D. 2003. Liquid supplement and forage intake by range beef cows. J. Anim. Sci. 81:294-303.

Upcoming Events

March 26

Construction Begins

(Please excuse the mess if you come to the office and be watchful of the work in progress. Watch for signs on where to park, etc. Thanks!)

April 30—May 1

School Tours

June 11

Tour

**Montana Stockgrowers Association and
Montana Farm Bureau**

Fort Keogh in Guinness World Records 2002

According to the Guinness World Records 2002, the largest snowflake in the world was found at Fort Keogh, Montana, on January 28, 1887, by Matt Coleman. Sue Stanton, the librarian at the Washington Middle School, let us know that she found this information in the Guinness World Records 2002. The snowflake was 15 in (38 cm) wide and 8 in (20 cm) thick, which Coleman later described as being 'larger than milk pans' in

the magazine *Monthly Weather Review*. A mail courier caught in the same snowstorm witnessed the fall of these giant flakes over several miles.



USDA-ARS Fort Keogh
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<http://www.larri.ars.usda.gov>

Feel free to pass on this issue of the Fort Keogh Researcher to others interested in agriculture and agricultural research.

To be added to our mailing list, request a copy through our website or contact Diona Austill by phone (406-232-8200), fax (406-232-8209), or email (diona@larri.ars.usda.gov)

New Progress Report:

**Fort Keogh
Livestock and Range
Research Laboratory**

2003 Research Report



USDA-Agricultural Research Service
In cooperation with the
Montana Agricultural Experiment Stations

2003 Research Report Now Available

If you would like a copy of the new research report, please call us at 406-232-8200, email us at reprints@larri.ars.usda.gov or write to us at USDA-ARS Fort Keogh, 243 Fort Keogh Road, Miles City, MT 59301-4016, and we'll be glad to send you one. This report contains 42 articles on our current research.